NAME:

For the following exercises, read the problems carefully and show all your work. Attach more pages if necessary. Please, turn in ONE pdf.

1 Derivatives

For each function, find its derivative:

1. $f(x) = \frac{1}{3}x^3$

2. $f(x) = \dfrac{x}{e^x}$

3. $f(x) = \dfrac{x^2 - 1}{x - 1}$

4. $f(x) = x^2(x - 1)$

5. $g(y) = 3e^y - \sqrt{y}$

6. $h(z) = ln(z) + 1/z + 3^z$

7. $f(x) = (x+3)^7(3x^4 - 2x^2 - 8)$

8. $g(x) = 27x^3 + 5x^2 - x + 13$

9. $g(x) = 81x^2 + 10x - 1$

10. $g(x) = 162x + 10$

11. $f(x) = e^{2x} + 3e^{-4x}$

12. $f(x) = xe^{2x}$

13. $f(x) = \ln((3x - 1)^2)$

14. $f(x) = \dfrac{5^x}{5}$

15. $f(x) = (1 + x^2)^3$

16. $f(x) = h(g(x))$, where $h(x) = \ln(x)$ and $g(x) = x^2$

17. $h(x) = f(g(x))$, where $f(x) = 6x + 3$ and $g(x) = -2x + 5$

18. $h(x) = f(g(x))$, where $f(x) = e^x$ and $g(x) = 4x$

19. $h(x) = f(g(x))$, where $f(x) = e^x$ and $g(x) = 3x^2 + 2$

20. $f(y) = (1 - 1/y^2)$

21. $f(y) = (y^3 - 7)(1 - 1/y^2)$

22. $f(x) = ln(2\pi x^2)$

23. $f(x) = x^6 + 5x^5 - 2x^2 + 8$

24. $g(y) = 3e^y - \sqrt{y}$

25. $f(x) = (x+3)^7(3x^4 - 2x^2 - 8)$

26. $g(x) = \frac{\sqrt{x^2+3}}{x}$

27. $m(x) = \dfrac{1}{1+\exp(x)}$

28. $g(x) = 27x^3 + 5x^2 - x + 13$

29. $f(x) = e^{x-ln(x)+5}$

30. $f(x) = \sqrt{x}e^{\sqrt{x}}$

31. $f(y) = \sqrt{\frac{(y^4-3y^2)ln(7y-4)}{e^{y^3-2y}}}$

32. $f(z) = ln(z^3 + 2z)\exp(1/z^2 + 2z - 2)$

For these functions, find the derivative at $x = 1$ and $x = 3$

33. $f(x) = 2x^2 + 7$

34. $f(x) = x^3 - x + 1$

Below is the probability density function for a normal distribution. Take the first derivative with regard to μ when $\sigma = 1$:

35. $f(x) = \frac{e^{-(x-\mu)^2/(2\sigma^2)}}{\sigma\sqrt{2\pi}}$